the NCERT is in accordance with the National Policy on Education, 1986 as modified in 1992.

Harnessing Natural Resources

2055. SHRI RAMDAS AGARWAL : Will the Minister of OCEAN DEVELOPMENT be pleased to state:

(a) what steps Government have taken so far to harness natural resources, indicating the technologies developed by the Ministry of Science and Technology during the last three years in the fields of Energy from Sea; Minerals from Sea and drugs from plants;

(b) what budgetary allocations have been made for this purpose during the same period and the expenditure incurred year-wise and location-wise; and

(c) what are the details of achievements made so far in harnessing natural resoruces ?

THE MINISTER OF OCEAN DEVELOPMENT (DR MURLI MANOHAR JOSHI) : (a) and (c) Harnessipg of natural resources and development of technologies for the same is an ongoing process. The details of technologies being developed/tested by institutes/laboratories funded by the Department of Ocean Development in the fields of Energy from Sea, mineral from sea and drugs from plants during the last three years are as under.

1. Energy from sea:

National Institute of Ocean Technology (NIOT), Chennai, an autonomous body under the Department of Ocean Development has taken up technology development for harnessing of ocean energy. Wave Energy and Ocean Thermal Energy Conversion (OTEC) are the major projects under this programme.

(i) **Wave Energy:**

The basic technology was developed for three sub-systems, *viz.,* conversion of wave energy to pneumatic energy, penumatic energy to mechanical energy and mechanical energy to electricity. After developing the capability for designing these sub-systems by IIT, Chennai, DOD funded another project to establish an integrated wave energy conversion technology demonstration plant at Vizhinjam near Trivandrum. This plant was commissioned with a peak capacity of 150 K.W. It was proven that wave energy could be pumped to the grid in Trivandrum through a long cable form the wave energy plant to the sub-station at Vizhinjam.

Subsequently, this facility was declared as a National Facility for developing wave energy related systems. Presently, this facility is being utilized for producing de-salinated water using wave power. A commercial plant of 10,000 litre/day capacity has already been installed at Vizhinjam. The wave energy turbine generator system is being modified to suit this de-salination plant.

(ii) Ocean Thermal Energy Conversion (OTEC) :

Department of Ocean Development has taken up a pioneering technology demonstration programme for generating electricity utilizing the temperature difference between the warm surface sea-water and the deeper cold sea-water by installing a 1 MW pilot OTEC plant. This Plant consists of a special floating OTEC platform for housing the OTEC plant, special titanium plate heat exchangers, cold and warm water pumps and 1 m dia, 1 km long cold water intake pipe which will also act as a structural element of the mooring system to integrate the barge to the sea floor at 1100 m depth. This will be the first MW range OTEC plant any where in the world.

2. **Minerals from the sea:**

The Department of Ocean Development (DOD) has an ongoing programme namely Polymetallic Nodules programme for the mineral resource assessment for Polymetallic Nodules in an area allocated to India in the Central Indian Ocean Basin and development of relevant technologies for exploitation of these resources in phases. Under this programme, an Indo-German project has been taken up by National Institute of Ocean Technology to jointly develop an integrated mining system for deep sea applications. This system has a special crawler designed by the University of Siegen, Germany, a single stage displacement pump and a flexible riser, which transports slurry to the mother ship. A crawler-based system can be monitored and powered remotely through an umbilical cable from ship control room.

While the system in its final form will be capable of operating upto 6,000 m water depth, in the initial stages the system has been successfully demonstrated at a depth of 410m off Tuticorin in the east coast during March, 2000.

The technology for Ocean Bed Mining presently demonstrated could be used with slight modifications for mining phosphorite deposits and placer minerals, dredging of sand bars in estuaries and other locations where floating dredgers cannot work, to desilt the storage areas of hydro-electric projects to increase their economic life and to survey the sea-bed and locate specific living and non-living resources.

3. Drugs from plants (marine flora)

The Central Drug Research Institute, Lucknow implements the Department of Ocean Development sponsored National Project on 'Development of Potential Drugs from the Ocean' as the nodal agency with nine other collaborating partners from Central Institutes/Universities. Two chemically different fractions of a marine organism (flora), CDR-134, are being developed as an antidiabetic againt non-insulin dependent diabetes mellitus (NIDDM) and another fraction as an antidiarrhoeal agent.

(b) The year-wise and allocation-wise break-up of the funds allocated during the last three years for the purposes are as follows :

Sl. No.	Purpose	Fu nds allocation (In lakhs of Rs.) 1998-99	1999-2000	2000-2001
1.	NIOT Mission Mode projects	1449,00	2400.00	1669.00
2.	PolymetallicNodiiles Programme (PMN)	2031.00	1074.00	1423.00
3.	Drugs from Sea	271.00	164.00	200.00

Double Line on Ghaziabad-Moradabad Rail Route

2066. CHAUDHARY HARMOHAN SINGH YADAV: Will the Minister of RAILWAYS be pleased to state :

(a) whether Government propose to lay down double line on Ghaziabad-Moradabad rail route; if so, the time schedule and if not, the reasons therefor;

(b) whether Government are aware that both the passenger and goods trains run late by several hours due to single rail line there, resulting in undue delay in transportation of goods; and

(c) if so, whether Government propose to make specific provisions in the Budget to convert this line in the next two years; if not, the reasons therefor?

THE MINISTER OF STATE IN THE MINISTRY OF RAILWAYS (SHRI O. RAJAGOPAL): (a) The entire doubling from Ghaziabad to Hapur completed and commissioned. The work is currently in progress in two phases of the project i.e Amroha-Moradabad and Amroha-Kankether.

(b) The section is saturated and patch doubling has been taken up to ease congestion.